

ANKARA - ISTANBUL SUPER SPEED RAILWAY PROJECT



PROJECT DESIGN





REPUBLIC OF TÜRKİYE
MINISTRY OF TRANSPORT
AND INFRASTRUCTURE

CURRENT AND PLANNED ANKARA – İSTANBUL HSR ROUTES

AYEM
Altyapı Yatırımları Genel Müdürlüğü





REPUBLIC OF TÜRKİYE
MINISTRY OF TRANSPORT
AND INFRASTRUCTURE

PLANNED ANKARA – İSTANBUL HSR ROUTE

AYEM
Altyapı Yatırımları Genel Müdürlüğü



HSR LENGTH: **344 km**
HSR TRAVEL TIME: **80 Minutes**

ÇATALCA

SÖĞÜTLÜÇEŞME

KOCAELİ

ADAPAZARI

MUDURNU

BİLECİK

NALLIHAN

BEYPAZARI

KIZILCAHAMAM

ANKARA

ESKİŞEHİR



CURRENT HSR TRAVEL TIME: 4 Hours 15 Minutes
PLANNED HSR TRAVEL TIME: 85 Minutes



Design Criteria-1/2

Design Criteria	V: 350 km/h		V: 330 km/h		V: 300 km/h		Project Criteria
	Desired	Lower Limit	Desired	Lower Limit	Desired	Lower Limit	
Minimum Horizontal Curve Radius	7500 m	7000 m	6750 m		5600 m		7000 m
Minimum Transition Curve Length	200 m		200 m	180 m	200 m	180 m	200 m
Maximum Horizontal Curve Radius	25000 m	25000 m	25000 m	25000 m	25000 m	25000 m	15000 m
Maximum Cant	≤140 mm	160 mm	≤140 mm	160 mm	≤140 mm	160 mm	160 mm
Cant Excess	50 mm	90 mm	50 mm	90 mm	50 mm	90 mm	-
Cant Deficiency	60 mm	80 mm	60 mm	80 mm	80 mm	100 mm	86,5
Lateral Acceleration	0,39 m/s ²	0,52 m/s ²	0,39 m/s ²	0,52 m/s ²	0,52 m/s ²	0,65 m/s ²	0,57
Cant Transition Rate	30 mm/s	45 mm/s	30 mm/s	45 mm/s	30 mm/s	45 mm/s	36,11
Cant Deficiency Transition Rate	30 mm/s	45 mm/s	30 mm/s	45 mm/s	30 mm/s	45 mm/s	24,11
Maximum Vertical Curve Radius		56000 m		56000 m		56000 m	40000 m
Maximum Vertical Acceleration	%2.25g	%3.25g	%2.25g	%3.25g	%2.25g	%3.25g	N/A
Maximum Track Gradient	≤ 1.5%	2.5%	≤ 1.5%	2.5%	≤ 1.5%	2.5%	%2.5
Maximum Track Gradient - In Tunnel and Cut	0.5%	0.2%	0.5%	0.2%	0.5%	0.2%	%0,00
Maximum Track Gradient - On Station Platform		0.25%		0.25%		0.25%	-

Note: A minimum of 2 seconds of driving is required on the same geometry.
Reference: HS2 Technical Standards
350 km/h = 98 m/s, Minimum same geometry length: 196 m (approximately 200 m)



Design Criteria-2/2

Design Criteria	V: 250 km/h		V: 200 km/h	
	Desired	Lower Limit	Desired	Lower Limit
Minimum Horizontal Curve Radius	4500 m		2500 m	
Minimum Transition Curve Length	150 m		150 m	120 m
Maximum Horizontal Curve Radius	25000 m	25000 m	25000 m	25000 m
Maximum Cant	≤140 mm	160 mm	≤140 mm	160 mm
Cant Excess	50 mm	90 mm	50 mm	90 mm
Cant Deficiency	80 mm	100 mm	100 mm	110 mm
Lateral Acceleration	0,52 m/s ²	0,65 m/s ²	0,65 m/s ²	0,72 m/s ²
Cant Transition Rate	30 mm/s	45 mm/s	35 mm/s	55 mm/s
Cant Deficiency Transition Rate	30 mm/s	45 mm/s	35 mm/s	55 mm/s
Maximum Vertical Curve Radius		56000 m		56000 m
Maximum Vertical Acceleration	%2.25g	%3.25g	%2.25g	%3.25g
Maximum Track Gradient	≤ 1.5%	2.5%	≤ 1.5%	2.5%
Maximum Track Gradient - In Tunnel and Cut	0.5%	0.2%	0.5%	0.2%
Maximum Track Gradient - On Station Platform		0.25%		0.25%













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STATIONS

AYEM
Altyapı Yatırımları Genel Müdürlüğü





Advices:



Train Capacity: To enhance operational flexibility and increase annual capacity factors, a train with 450 to 500 seats is required.



Number of Trips: 3 trips per hour during peak hours, 2 trips per hour during off-peak hours and weekends.



Fleet: Based on the recommended train capacity and service plan, 20 trains (set of 8) should be purchased.



Number of Train Decks: A single-deck train will provide the desired capacity and potentially offer higher levels of comfort.



1st/Economy Class: Based on the HSR European experience and characteristics of the Turkish market, a 20% to 25% share of 1st class seats is recommended.



Restaurant: To maintain train capacity, the existence of a restaurant/cafe should be limited to half a carriage.



Luggage Volume: To enhance travel comfort, additional space for luggage may be needed in overhead compartments or throughout the cabin, but it could reduce capacity.



Sample Train Design





Sample Train Design



TRAIN AND FLEET REQUIREMENTS

Sample Train Design

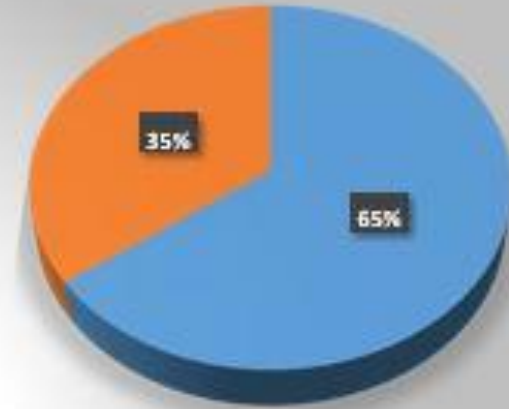


EXPROPRIATION

As a result of the conducted studies, it has been determined that 751 hectares of land will be expropriated. Efforts have been made to avoid expropriation as much as possible. Of the total expropriation area, 65% is determined as state-owned and 35% as private parcels.

During project studies, when considering geometric standards and design line speed limits, the project design has been restricted in various aspects. It is necessary to emphasize that, considering both track safety and the desired speed, the geometric design of the track will not change in terms of horizontal and vertical design and has reached its final form.

Percentage of Expropriated Area



Expropriated State-Owned Land Area (4,886,700 m²)

Expropriated Private Land Area (2,631,300 m²)

FEASIBILITY STUDIES





55,000

daily passengers

3444

kilometers
of track
length

**Express
Transportation
to Istanbul**

80

minutes
of travel
time

350

km/h
speed

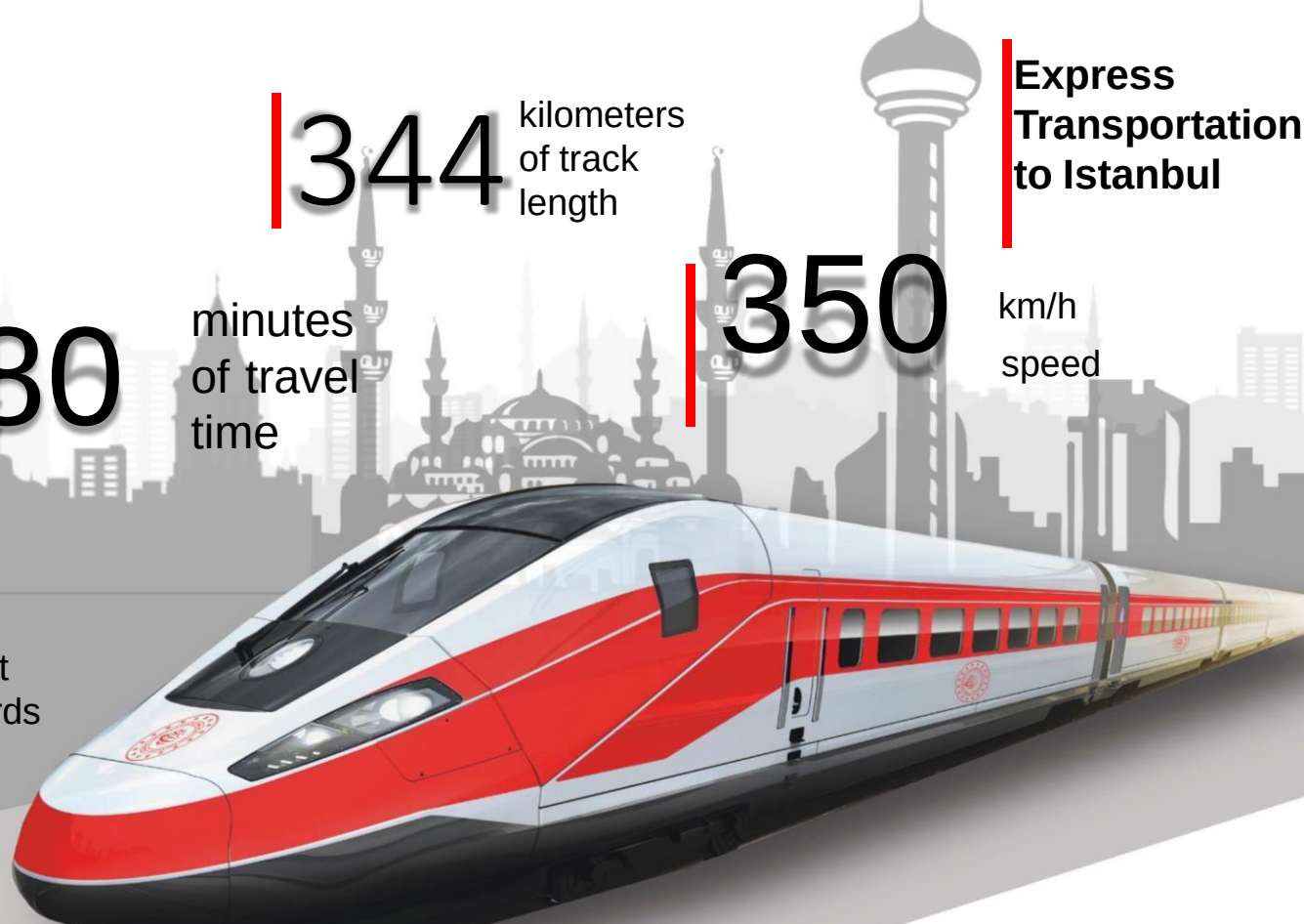
500

passenger
capacity per
train

A Safe, Comfortable, and Fast
Route in International Standards

20

Train – Set of 8





295 MILLION €/YEARS

Operation and Maintenance



495 MILLION €/YEARS

Time Savings

263 MİL €/YIL

Environmental Impacts

TOTAL 14 MILLION
TONS OF CO2
SAVINGS
€545 BILLION

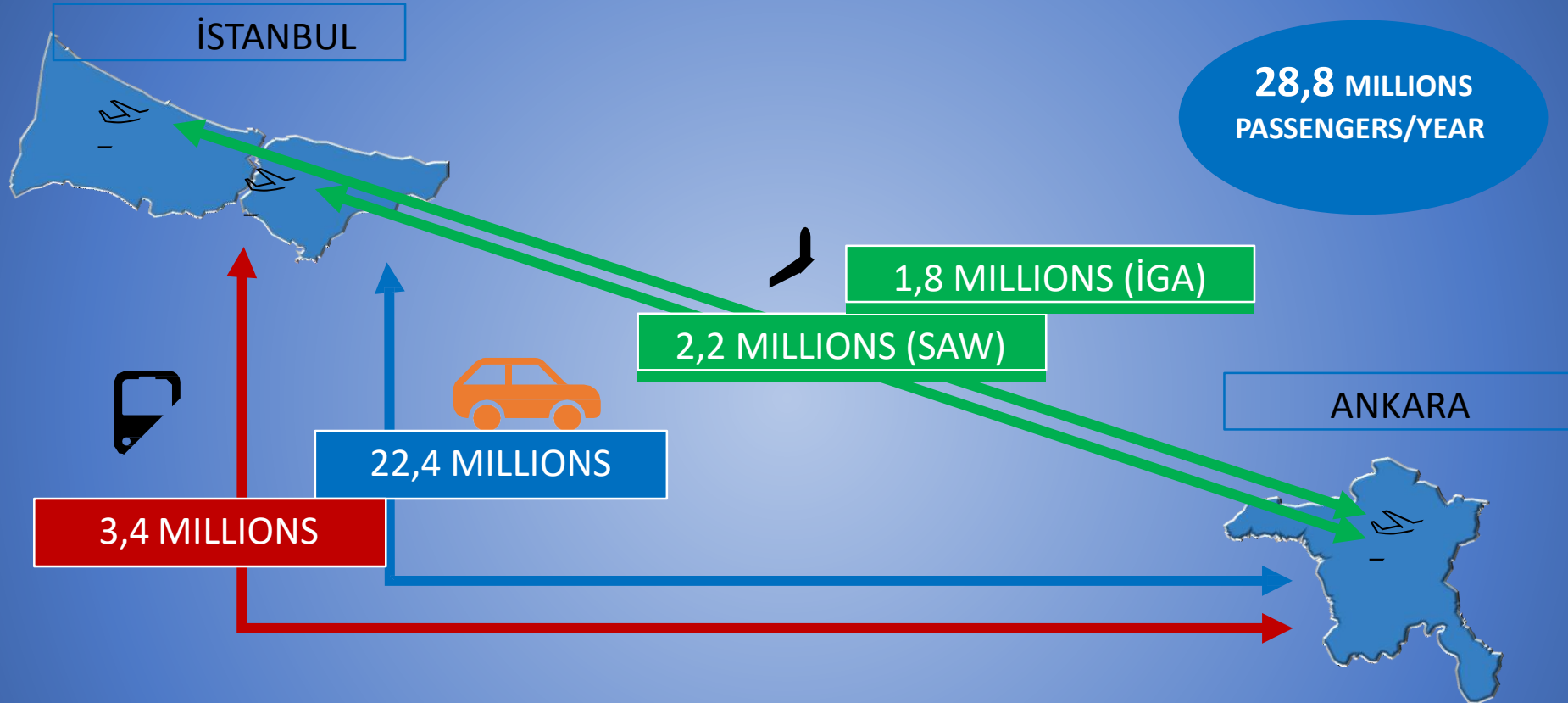
0,5 MILLION €/YEARS

Accident Savings

TOTAL ECONOMIC GAIN
€1,598.5 MILLION PER YEAR









Parametre	Airline (THY & PGS)	Railway	Private Car	Bus
Time Spent in the Vehicle (one-way)	1 hrs 05 min	4 hrs 40 min	5 hrs 30 min	7 hrs 00 min
Total Travel Time (one-way)	4 hrs 15 min	5 hrs 40 min	5 hrs 30 min	8 hrs 00 min
Number of Trips (round-trip)	56	16	-	368
Passenger Count (2019)	4,04 Millions	3,42 Millions	21,3 Millions	1,13 Millions

